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Soybean Planting Date and Growth and Development

Abstract

Soybean planted either the last week of April or the first week of May typically produces yields greater than later planted soybean. This project will determine if initiation and duration of particular growth stages, along with main stem node accumulation explain why early planted soybean (late April/early May) yield greater than late planted soybean (mid May). Six planting dates with a one week interval were planted at seven Iowa State University (ISU) research stations and growth stages of the plants from the different planting dates were determined twice weekly.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Soybean Planting Date and Growth and Development

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Introduction

Soybean planted either the last week of April or the first week of May typically produces yields greater than later planted soybean. This project will determine if initiation and duration of particular growth stages, along with main stem node accumulation explain why early planted soybean (late April/early May) yield greater than late planted soybean (mid May). Six planting dates with a one week interval were planted at seven Iowa State University (ISU) research stations and growth stages of the plants from the different planting dates were determined twice weekly.

Materials and Methods

The experiment was a randomized complete block design with three replications. Main plots were six planting dates (April 18, April 24, May 2, May 9, May 16, and May 23). Plot size was 10 ft × 50 ft, with 25 ft used for biomass sampling and developmental notes and 25 ft used for harvest. The soybean variety was K283RR/SCN. Seed was treated with an insecticide/fungicide seed treatment, Cruiser Maxx. Each plot was planted in four rows at 30-in. row spacing at a rate of 160,000 seeds/acre and a seeding depth of 1.5-in. Four plants were evaluated to determine growth stage two times a week for 20 weeks until plants reached harvest maturity. The plots were sprayed May 19 and June 21 with Roundup WeatherMAX to control weeds. They were also sprayed August 1 with Mustang Max to control soybean aphids. Plots were harvested with an Almaco small-plot combine on September 27. Grain yields were adjusted to 13% moisture. Reported yields and other harvest measurements are shown in Table 1. Dates at which plants

reached a particular growth stage and the maximum number of main stem nodes are shown in Table 2.

Results and Discussion

Yields of the April 18, 24, and May 2 planting dates were 7 bushels/acre more than the May 9 or later planting dates. Lowest yields were attained at the May 16 and 23 planting dates. Plants were shorter when planted on April 18 but greater plant height for later planting dates did not contribute to greater plant lodging. Soybeans planted on April 18, 24, and May 1 produced one more main stem node compared with May 9 planting and two more than the last two dates. Time between planting and emergence was 13 days for the April 18 planting date but dropped to less than 10 days for all other planting dates. Delayed emergence with April 18 did influence plant establishment and final stands were less than 100,000 plants/acre. Plants began to flower on June 5 for the April 18 planting date, but were delayed until June 29 for the May 23 planting date. Time between the R1 and R5 growth stages (seed number determination period) was 10 days longer for the April 18 planting date compared with the May 22 planting date. Plants reached harvest maturity 3 to 5 days earlier for planting dates that occurred prior to May 12. Data collected from this experiment support early planting for achieving maximum soybean yield. Growth changes such as earlier flowering, longer seed determination period, and more main stem nodes may all contribute to greater yields at early planting dates. This project will continue in 2008 and 2009.

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Table 1. Effect of planting date on soybean plant density, height, lodging, moisture, and yield.

Planting date	Plant density × 1,000	Height (in.)	Lodging 1–5†	Moisture (%)	Yield (bushels/acre)
April 18	92.7	38.7	1.0	13.0	82.2
April 24	122.7	41.0	1.0	12.7	84.8
May 2	129.8	44.3	1.0	12.7	85.1
May 9	130.7	43.7	1.0	12.6	77.2
May 16	127.1	41.7	1.0	12.5	73.0
May 23	134.2	42.0	1.0	12.9	64.0
LSD (0.10)	20.6	3.2	NS¶	NS	8.2

†Lodging score: the range extended from 1 = erect to 5 = flat.

¶NS, not significant at $P \leq 0.10$.**Table 2. Effect of planting date on day of emergence, timing of reproductive stage, and maximum main stem node accrual.**

Planting date	Emergence	Reproductive stage								Maximum main stem nodes
		1	2	3	4	5	6	7	8	
Apr 18	May 1	Jun 5	Jun 12	Jun 22	Jul 6	Jul 17	Jul 27	Aug 28	Sep 7	20
Apr 24	May 4	Jun 5	Jun 15	Jun 26	Jul 13	Jul 20	Aug 7	Sep 4	Sep 11	20
May 2	May 11	Jun 8	Jun 15	Jun 26	Jul 17	Jul 27	Aug 10	Sep 4	Sep 11	20
May 9	May 15	Jun 15	Jun 22	Jul 10	Jul 23	Jul 27	Aug 14	Sep 7	Sep 14	19
May 16	May 25	Jun 19	Jul 6	Jul 20	Jul 23	Jul 31	Aug 24	Sep 11	Sep 18	18
May 23	Jun 1	Jun 29	Jul 10	Jul 20	Jul 27	Jul 31	Aug 28	Sep 14	Sep 18	18